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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/029,145	12/28/2001	Jung Il Kim	0465-0882P-SP	5232
2292	7590	08/24/2005	EXAMINER	
BIRCH STEWART KOLASCH & BIRCH PO BOX 747 FALLS CHURCH, VA 22040-0747			QI, ZHI QIANG	
			ART UNIT	PAPER NUMBER
			2871	

DATE MAILED: 08/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/029,145

Applicant(s)

KIM ET AL.

Examiner

Mike Qi

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 15 June 2005.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14-24 and 26-28 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14-24 and 26-28 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1, 6-8, 14-17, 23-24 and 26-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over US 6,337,520 (Jeong et al) in view of US 6,433,842 (Kaneko et al) and US 6,310,674 (Suzuki et al).

Regarding claims 1, 8, 17 and 26-28, Jeong discloses (col.6, line 56 – col. 8, line 49; Figs.9 -11) a liquid crystal display device comprising:

- substrate (100);
- TFT having gate electrode (210) and source (610)/drain (620) electrodes on the substrate (100);
- passivation film (700) formed on an entire surface of the substrate (100) and having contact hole (710) in the drain electrode (620) of the TFT;
- pixel electrode (800) made of transparent conductive film (ITO) with sufficient thickness (500 – 2000 Å) connected to the drain electrode (620) through the contact hole (710), and the drain electrode (620) having a single-layer structure;

(concerning claims 8 and 27):

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- metal film (gate electrode 210, gate pad 220 and gate line 200 formed of Al or Al alloy) on the substrate (100);
- metal film formed of same material as gate line;

(concerning claims 17 and 28):

- forming gate line (200) including a gate electrode (210) and gate pad (220) on substrate (100);
- forming gate insulating film (300) on the entire surface of the substrate (100);
- forming semiconductor film (amorphous silicon layer 400) above the gate electrode (210);
- forming data line (600) including a data pad (630) to form source and drain electrodes (610,620) of TFT at both sides above the semiconductor film (400);
- forming passivation film (700) on the entire surface of the substrate (100);
- forming contact holes (such as 710, 720,730) in the drain electrode (620), the gate pad (220) and the data pad (630) of the TFT;
- forming, in each pixel region, transparent conductive film (ITO) such as pixel electrode (800) connected to the drain electrode (7), gate ITO layer (810) connected to the gate pad (220) and data ITO layer (820) connected to the data pad (630) through contact holes (710,720,730);
- drain electrode (620) having a single-layer structure (col.8, lines 29-30).

Jeong does not explicitly disclose that the pixel electrode made of an amorphous

transparent conductive film or a polycrystalline transparent conductive film for preventing a generation of a galvanic effect.

**Kaneko** discloses (col.5, lines 47-51) that amorphous indium tin oxide (a-ITO) or indium zinc oxide (IZO) (amorphous transparent conductive film) allows for use of a weak-acid etchant is preferably used as the material of the pixel electrodes so that the aluminum alloy (such as the drain electrode under the pixel electrode made of metal) is prevented from being damaged during etching of the pixel electrodes. Even though Kaneko discloses that the amorphous ITO is used in case of a layered structure for the drain lines, Kaneko discloses the function of the amorphous ITO and the property of the amorphous ITO.

Kaneko further indicates (col.5, lines 61-65) polycrystalline indium tin oxide poly-ITO) having high reliability as the pixel electrodes.

The galvanic effect means that the electrode generates galvanic corrosion during etching step, and that is a general available knowledge.

Furthermore, **Suzuki** discloses (col.4, lines 43 – 65) that as a display electrode, the material preferably is the ITO comprises amorphous component to improve surface smoothness, and as a result, damage to underlying layers can be alleviated, so as to enhance the display performances.

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Jeong with the teachings of using amorphous transparent conductive film or a polycrystalline transparent conductive film as the material of the pixel electrode as taught by Kaneko for preventing a

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generation of a galvanic effect so as to protect the electrodes damage during etching of the pixel electrode, since transparent film containing an amorphous component (amorphous transparent conductive film ITO or poly-ITO) having high reliability (see Kaneko col.5, lines 59-61).

Regarding claims 6-7, 15-16 and 23-24, Jeong discloses (col.12, lines 11-17) that pixel electrode (800) formed of ITO layer with thickness of 300 -2000 Å, and the thickness range overlaps the thickness range 500-2000 Å as claimed (see MPEP 2144.05, I “overlap ranges disclosed by the prior art” a prima facie case of obviousness exists).

Regarding claim 14, Jeong discloses (Fig.10) that the metal film such as the drain electrode (620) having a single-layer structure.

3. Claims 2-5, 9-12 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jeong, Kaneko and Suzuki as applied to claims 1, 6-8,14-17, 23-24 and 26-28 above, and further in view of US 5,135,581 (Tran et al).

Regarding claims 2-5, 9-12,18-22, Jeong and Kaneko teach the invention set forth above. Jeong and Kaneko lack that the ITO or IZO added H<sub>2</sub> or H<sub>2</sub>O and formed at a predetermined temperature.

Tran discloses (col.2, line 20 – col.3, line 5) that a process for forming a light transmissive electrically conductive composition at a temperature from 20°C to 300°C and using sputtering gas and stabilizing gas such as H<sub>2</sub> or H<sub>2</sub>O. Tran indicates (col.2, line 20 – col.3, line 5) that such forming process at the temperature from 20°C to 300°C

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(overlap range with 150°C to 350°C) and containing such stabilizing gas H<sub>2</sub> or H<sub>2</sub>O advantageously reduces the visible light absorption and renders more stable.

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists (see MPEP 2144.05, I).

Therefore, it would have been obvious to those skilled in the art at the time the invention was made to modify the liquid crystal display of Jeong, Kaneko with the teachings of forming process as taught by Tran for achieving more stable electrode, since such process advantageously reduces the visible light absorption and renders more stable (see col.2, lines 20-27).

### ***Response to Arguments***

4. Applicant's arguments filed on June 15, 2005 have been fully considered but they are not persuasive.

1) The reference Kaneko is relied on using amorphous transparent conductive film allows for use of a weak-acid etchant is preferably used as the material of the pixel electrodes; and alternately, the drain lines are composed of a single layer, so that means in case of using single layer structure for the drain electrode, the material of amorphous ITO also can be used for the pixel electrode (see col.5, lines 47-51).

2) The galvanic effect means that the electrode generates galvanic corrosion during etching step, and that is a general available knowledge.

### ***Conclusion***

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5. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The prior art of record such as US 5,811,836 (Ha) discloses (col.2, lines 5-10) that the pixel electrode is easily damaged during the etching process of the metal, and this damage is caused by a galvanic effect during wet etching. Therefore, the material amorphous ITO or IZO or poly-ITO is used for preventing the damage during etching of the pixel electrode caused by a galvanic effect, and that is a general available knowledge.

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mike Qi whose telephone number is (571) 272-2299. The examiner can normally be reached on M-T 8:00 am-5:00 pm.



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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Kim can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Mike Qi  
Patent Examiner

  
**ROBERT KIM**  
**SUPERVISORY PATENT EXAMINER**